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Original Article

Assessment of risk factors associated with malocclusion among children visiting dental teaching hospital in Islamabad.

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Abstract:

Introduction: Malocclusion was declared as a third priority prevailing oral health problem by World Health Organization. A timely evaluation of the factors associated with malocclusions in the primary dentition could help in the prevention and better management of occlusion-related complications.

Objectives: This survey explored the frequency of risk factors in association with nonnutritive and oral contributors among children.

Methodology: A pre-validated questionnaire used for this cross-sectional study conducted between October 2019 to December 2019. The study participants were children of age 10 to 16 years visiting orthodontics department of a private dental hospital in Islamabad. Convenience sampling was applied to collect data. Statistically investigation was analyzed through SPSS software version 21. Descriptive analysis involved presentation of frequency and percentages whereas inferential analysis involved chi square association test of demographics with malocclusion risk factors.

Results: Majority of the surveyed children brush teeth once daily. Mixed method of horizontal as well as vertical style of brushing was utilized by 50.5% of the study participants. The hereditary factor from siblings was most frequently reported factor of malocclusion in current investigation. The results also indicate presence of significant association between class I, class II and class III of dental malocclusion and nonnutritive and oral habits among children ($P < 0.05$).

Conclusion: Desire This investigation concluded that gender, age and bad oral habits are strongly associated with malocclusion of teeth. Proper attention from parents for tooth care at early age can decrease the prevalence of malocclusion.

Keywords: Dental malocclusion, oral habits, nonnutritive habits, children.

Introduction:

Malocclusion is a morphological deviation from the normal arrangement of teeth and abnormal relation among teeth and dentation leading to deficient chewing, speech articulation, and undesirable jaw bone development.[1,2] It is a condition that involves multiple factors and is often associated with components of development such as obstruction in nasal area that impairs breathing through nasal passage, habits that involve thumb sucking, hereditary factors, genetics, as well as ethnicity.[3,4] After other dental diseases, caries and periodontal, malocclusion is next on the list for being the oral pathologies that are most common and with which patients visit dental clinics and complain about these irregular arrangements of their teeth that lead to improper closing of teeth or eruption of them in line along with facing other problems in smiling, biting their food, talking, and being teased by others.[5] Malocclusion has not been investigated in detail as the pain is not that severe but it causes discomfort to an individu-

al and effects their quality of life and causes limitations in social and functional aspects.[5,6] Both genetic as well as environmental factors may cause malocclusion. The environmental problems may include anthropometric characteristics, children and mothers' behavior, oral problems, problem faced during childhood and socioeconomic conditions. It is hereditary most of the times, meaning it passes from one generation to another also among families and can be caused by differences in sizes of jaws (upper and lower), size of tooth and between the jaw which will cause bite patterns that are abnormal and overcrowding.[3,4] Other than this shape of jaws and birth defects, cleft palate and lips, can also be a cause of malocclusion.[7]

Prevalence of malocclusion varies across the World in different countries depending upon associated risk factors. Need for treatment of orthodontic problems largely varies in different nationalities ranging from 11% in Sweden to 75.5% in Saudi Arabia, whereas within India it varies from 20 to 43 percent.[8] Malocclusion prevalence is high among adolescence. Normal Occlusion's prevalence among 13-20 years old Nigerians was 11.8% back in 2014[9] whereas among 11-14 years old Iranian children this percentage was 77.1%, but all in all its prevalence is reported to be 20-80% in different studies.[10] This wide variation of range is due to the differences such as that of age, ethnicity, and procedures of registration. Study that was conducted in Denmark reported 14% Normal, 58% Class I, 24% Class II, and 4% Class III malocclusion in its prevalence whereas Chinese who live in Australia the prevalence of different types of malocclusions is 7.1% Normal, 58.8% Class I, 21.5% Class II, and 12.6% Class III. This prevalence changed from 11-93% in researches that were conducted in Anatolia, Cicero, India, in Black Americans, and in Korean participants.[10] Even after being declared as the third most prevailing priority among oral problems by "World Health Organization" developing countries are still in a continuous battle to eradicate this preventable problem of orthodentry. [11,12] A proper and timely evaluation of the factors associated with malocclusion in the early life could help in the prevention and better management of occlusion-related problems later in life. In Pakistan the problem has not been investigated extensively and conclusively.

Objective:

To document prevailing malocclusion among the children 10 to 16 years and associated risk factors in dental hospital settings in Islamabad.

Methodology:

This descriptive, cross-sectional study conducted at a private dental teaching hospital of Islamabad from October 2019 to December 2019. The study was ethically cleared and approved by the ethical review board (No.F.1-1/2015/ERB/SZABMU/388 and advance studies and research board of Shaheed Zulfiqar Ali Bhutto medical university, Pakistan Institute of medical sciences (No.F.2-11SZABMU/AS&RB-63-2019 Islamabad, Pakistan. By using convenience sampling method, the data of children aged between 10-16 years having malocclusion (angle classification) was collected. The patients with multiple disorders, extracted permanent 1st molars, facial trauma and previous history of ongoing orthodontic treatment were excluded from the study. Sample size was calculated by using World health organization sample size calculator, at confidence level of 95% with anticipated population proportion (prevalence of malocclusion) of 20%[8] with absolute precision of 8%.The sample size calculated was 97. A pre validated questionnaire consist of demographic characteristics of the children such as age, gender, birth place (urban/rural), and parental attitude toward the problem of malocclusion (positive/not concerned) was used to collect data (11).Written informed consent was taken from each participant. The collected data was entered and analyzed by SPSS version 21. Frequencies and percentages were calculated for variables. Chi-square test was applied to observe association of malocclusion with risk factors and habits. P- Value < 0.05 were considered significant.

Results:

Demographics and Frequency of risk factors associated with malocclusion, observational scale of oral factors and non-nutritive habits.

Male respondents were more with rural background. Class II of dental malocclusion was most frequent. The timing of tooth brush per day showed that once per day was the most frequent timing of brushing. Mixed method was the most frequently used style of brushing. Hereditary factor from siblings was most frequently reported factor of malocclusion among children. Most frequent non-nutritive habits were lip biting and finger sucking. The highest percentage were observed in oral factors among deciduous tooth extraction and caries in

deciduous teeth. The detailed description is presented in Table 1.

Table 1: Demographics and Frequency and percentage of risk factors associated with malocclusion, observational scale of oral factors and non-nutritive Habits.

Characteristics	Frequency	Percentage
Age in years (10-16)	97	100
Gender		
Male	58	59.8
Female	39	40.2
Residence		
Urban	32	33
Rural	65	67
Class of Malocclusion		
Class I	16	16
Class II	45	46
Class III	37	38
Frequency of risk factors associated with dental malocclusion among children		
Frequency of tooth brush per day		
Once	50	51.5
Twice	21	21.6
More than twice	4	4.1
Only occasionally	22	22.7
Style of brushing		
Vertical	20	20.6
Horizontal	28	28.9
Mixed	49	50.5
Hereditary factor		
Mother	6	6.2
Father	7	7.2
Sibling	48	49.5
Grandparents	8	8.2
None	28	28.9
Frequency and percentage of observational scale of non-nutritive Habits		
Nail Biting	49	50.5
Lip Biting	69	71.1
Finger sucking	68	70.1
Tongue Thrusting	41	42.3
Mouth Breathing	35	36.1
Clenching/Bruxism	22	22.7
Frequency and percentage of observational scale of oral factors		
Hypodontia	13	13.4
Hyperdontia	16	16.5
Impactions	39	40.2
Spacing	30	30.9
Crowding	33	34
Transposition	37	38.1
Retained Deciduous Teeth	33	34
Caries in Deciduous Teeth	52	46.4
Deciduous Tooth Extraction	51	52.6
Orthodontic Treatment	25	25.8

Association between classes of dental malocclusion and non-nutritive factors among children.

The table 2 showed the association between classes of dental malocclusion and non-nutritive factors among children.

Table 2: Association between classes of dental malocclusion and non-nutritive factors among children.

Characteristics	Yes	No	Chi-Square value (df=1)	P-Value
Association between class I of dental malocclusion and non-nutritive factors among children				
Nail biting No Yes	 40 41	 8 8	0.964	0.00
Lip Biting No Yes	 25 56	 3 13	0.955	0.00
Finger Sucking No Yes	 26 55	 3 13	1.13	0.00
Tongue thrusting No Yes	 42 39	 14 2	6.95	0.00
Mouth breathing No Yes	 52 29	 10 6	0.89	0.00
Clenching/Bruxism No Yes	 63 18	 12 4	0.80	0.00

Characteristics	Yes	No	Chi-Square Value (df=1)	P-Value
Association between class II of dental malocclusion and non-nutritive factors among children				
Nail biting No Yes	 30 22	 18 27	3.02	0.00
Lip Biting No Yes	 15 37	 13 32	0.99	0.00
Finger Sucking No Yes	 17 35	 12 33	0.41	0.00
Tongue thrusting No Yes	21 31	25 20	0.16	0.00
Mouth breathing No Yes	35 17	27 18	0.55	0.00
Clenching/ Bruxism No Yes	39 13	36 9	0.34	0.00
Association between class III of dental malocclusion and non-nutritive factors among children				
Nail biting No Yes	 26 34	 22 15	2.38	0.00
Lip Biting No Yes	 16 44	 12 25	0.37	0.00
Finger Sucking No Yes	 15 45	 14 23	1.80	0.00
Tongue thrusting No Yes	39 21	17 20	3.40	0.00
Mouth breathing No Yes	36 24	26 11	1.04	0.00
Clenching/ Bruxism No Yes	48 12	27 10	0.64	0.00

In class I the molar relationship of the occlusion is normal or as described for the maxillary first molar. In class II the mesiobuccal cusp of the upper first molar is not aligned with the mesiobuccal groove of the lower first molar. Instead, it is anterior to it. In class III the upper molars are placed not in the mesiobuccal groove but posteriorly to it. The mesiobuccal cusp of the maxillary first molar lies posteriorly to the mesiobuccal groove of the mandibular first molar. The results explain that there is a significant association between nail biting, lip biting, finger sucking, tongue thrusting, mouth breathing, clenching/bruxism and classes of dental malocclusion.

Association between classes of dental malocclusion and oral factors among children

Characteristics	**Yes**	**No**	**Chi-Square Value**	**P-Value**
Association between class I of dental malocclusion and oral factors among children				
Hypodontia No Yes	 69 12	 15 1	0.844	0.00
Hyperdontia No Yes	 69 12	 12 4	1.00	0.00
Impaction No Yes	 46 35	 12 4	1.84	0.00
Spacing No Yes	 51 30	 16 0	8.57	0.00
Crowding No Yes	 32 49	 1 15	6.58	0.00
Transposition No Yes	 49 32	 11 5	0.38	0.00
Retained deciduous teeth No Yes	 56 25	 8 8	2.18	0.00
Caries in deciduous teeth No Yes	 37 44	 8 8	0.10	0.00
Deciduous tooth extraction No Yes	37 44	9 7	0.59	0.00
Orthodontic treatment **No** **Yes**	 56 25	 16 0	6.65	0.00

Characteristics	Yes	No	Chi-Square Value	P-Value
Association between class II of dental malocclusion and oral factors among children				
Hypodontia				
No	48	36	3.14	0.00
Yes	4	9		
Hyperdontia				
No	43	38	0.05	0.00
Yes	9	7		
Impaction				
No	18	24	1.45	0.00
Yes	34	21		
Spacing				
No	37	30	0.22	0.00
Yes	15	15		
Crowding				
No	17	16	0.08	0.00
Yes	35	29		
Transposition				
No	37	23	4.10	0.00
Yes	15	22		
Retained deciduous teeth	22	30	3.42	0.00
No	34	11		
Yes				
Caries in deciduous teeth	24	21	0.96	0.00
No	28	24		
Yes				
Deciduous tooth extraction	24	22	0 .78	0.00
No	28	23		
Yes				
Orthodontic treatment	41	31	1.25	0.00
No	11	14		
Yes				

Characteristics	Yes	No	Chi-Square Value	P-Value
Association between class III of dental malocclusion and oral factors among children				
Hypodontia				
No	51	33	0.34	0.00
Yes	9	4		
Hyperdontia				
No	49	32	0.38	0.00
Yes	11	5		
Impaction				
No	25	23	0.14	0.00
Yes	35	14		
Spacing				
No	45	22	2.58	0.00
Yes	15	15		
Crowding				
No	17	16	2.26	0.00
Yes	43	21		
Transposition				
No	26	26	1.79	0.00
Yes	34	11		
Retained deciduous teeth	19	23	0.38	0.00
No	41	14		
Yes				
Caries in deciduous teeth	29	16	0.23	0.00
No	31	21		
Yes				
Deciduous tooth extraction	31	15	1.13	0.00
No	29	22		
Yes				
Orthodontic treatment	46	26	0.48	0.00
No	14	11		
Yes				

The table 3 showed the association between classes of dental malocclusion and oral factors among children. Part one shows association with class I malocclusion, part two shows association with class II malocclusion while part three of table no 3 shows association of malocclusion with oral factors.

The results explain that there is a significant association between hypodontia, hyperdontia, impaction, spacing, crowding, transposition, deciduous teeth, and caries in deciduous teeth, deciduous tooth extraction, orthodontic treatment and classes of dental malocclusion.

Discussion:

Malocclusion is deviation of arrangement of teeth from the normal. Oral cavity is affected that teeth ei-

ther look like crowded, crooked, or protruded with the development of undesirable jaw bones, speech articulation, defective chewing with or without pathological relation. Malocclusion is correlated with associated factors for investigational purposes.[12] The current survey investigated the frequency of nonnutritive associated risk factors and oral contributors among Pakistani sampled children population of 10-16 years of age. Male children found more affected by dental malocclusion, a finding in agreement to that reported from India and China.[13,14] Urban population is less affected in Islamabad, identical finding reported from Peshawar.[15] Malocclusion class II (46%) found more prevalent, followed by class III (38%) and class I (16%). The highest prevalence of class II is also reported from Turkey[16], in India and Thailand class I was is prevalent.[17, 18] More than 50% of the sampled population brush once daily similar to Saudi Arabia population[19] instead of adopting the international standard of twice daily. Mixed style of horizontal and vertical brushing was followed by half of the study populace.

Heredity factors may be associated with malocclusion. Sibling's heredity malocclusion relationship reported to be among 49.5% of the children.[20] In 28.9% of the children no heredity malocclusion relationship was observed. Bad oral habits of finger sucking, lip biting and tongue thrusting resulted in greater incidence of malocclusion in children.[21, 22] Most frequent non-nutritive habits were lip biting, finger sucking and nail biting in current investigation. Lowest non-nutritive habits were clenching/bruxism, mouth breathing and tongue thrusting. The highest percentage were observed in oral factors among deciduous tooth extraction, caries in deciduous teeth and impactions. Lowest oral factors in sampled population were hyperdontia and hypodontia. Association between non-nutritive habits, oral factors and development of malocclusion was observed globally.[23] A survey in Italy observed no association with non-nutritive habits[24,25] while some investigations reported severe malocclusion in association with bad habits.[26] The current investigation concluded statistically significant association between Class I, II and III of malocclusion and all of the non-nutritive factors and oral factors among children in Islamabad. There is a need of further investigation in different cities of Pakistan to rule out the genetic involvement and factor contribution in malocclusion. This will facilitate the process of developing effective preventive strategies aimed at the causative factors prevalent in the dental hospitals.

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